



M I C R O T U N E®

## MT1393ETC FM/RDS TUNER MODULE

### PRODUCT BRIEF

The MT1393ETC is a highly integrated FM tuner module with an on-board data decoder for RDS (Europe) as well as RBDS (US).



MT1393ETC FM/RDS Tuner Module

RF SILICON AND SUBSYSTEMS SOLUTIONS  
FOR BROADBAND COMMUNICATIONS AND AUTOMOTIVE ELECTRONICS

The MT1393ETC FM/RDS Tuner Module is specifically designed to meet the demanding performance targets of automotive customers, at an attractive price. This tuner module has been developed for both FM audio reception as well as RDS/RBDS data reception and includes both an integrated receiving condition analyzer and an integrated RDS/RBDS decoder. The high level of functionality makes this tuner module an ideal solution for use as a dedicated background tuner enabling data services offered via RDS/RBDS and monitoring alternate frequencies. Its excellent sensitivity and strong signal performance produce clear audio and reliable data reception, even under critical receiving situations.

The MT1393ETC is environmentally hardened to operate over an extended temperature range and under adverse climatic conditions and offers a very small form factor for space-critical applications. The tuner section of the module contains a double down-conversion system with a selective pre-filter circuit and image reject mixers. The dynamic selectivity function evaluates the current receiving situation continuously and automatically determines the optimum IF bandwidth. The audio path provides an MPX signal output for external stereo decoding.

The RDS/RBDS portion of the MT1393ETC contains, in addition to the demodulator and decoder, data processing functions including synchronization and error correction. An integrated RAM buffer for up to 24 RBS/RBDS blocks decreases the number of data pulls via the I<sup>2</sup>C bus. This serial bus is used to control frequency settings and multiple programmable functions of the MT1393ETC.

### APPLICATIONS

- Car radios (FM audio reception or background data reception)
- Dynamic navigation systems (Traffic data reception)

### FEATURES

#### FM

- Double down-conversion
- Selective pre-filter circuit
- Image reject mixers
- Keyed AGC selectable, AGC-threshold programmable
- Highly sophisticated IF filter technology with dynamically controlled bandwidth
- FM demodulator with noise cancellation
- Receiving condition analyzer with detectors for "adjacent channel", "multipath" and "fieldstrength"
- Stop signal output
- Adjustable softmute control
- Multiplex (MPX) audio output

#### RDS

- Integrated demodulator and decoder
- Supports European RDS and US RBDS
- Automatic group- and block-synchronization
- Error detection and error correction
- RAM with a capacity of 24 blocks
- Programmable interrupt for readout of data via I<sup>2</sup>C bus

#### GENERAL

- I<sup>2</sup>C bus-controlled
- On-board EEPROM supports digital alignment
- Very small form factor
- Design tool: Evaluation Kit MT1393ETC\_EK available

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# MT1393ETC FM RDS TUNER MODULE

## PRODUCT BRIEF

### OPERATING CHARACTERISTICS

PARAMETER	MIN	TYP	MAX	UNIT
5V Power supply voltage				
Current		35		mA
Voltage	4.5	5	5.5	V
8.5V Power supply voltage				
Current		100		mA
Voltage	8	8.5	9	V
Operating temperature	-40		+85	°C
Storage temperature	-40		+95	°C

### INPUT/OUTPUT CHARACTERISTICS

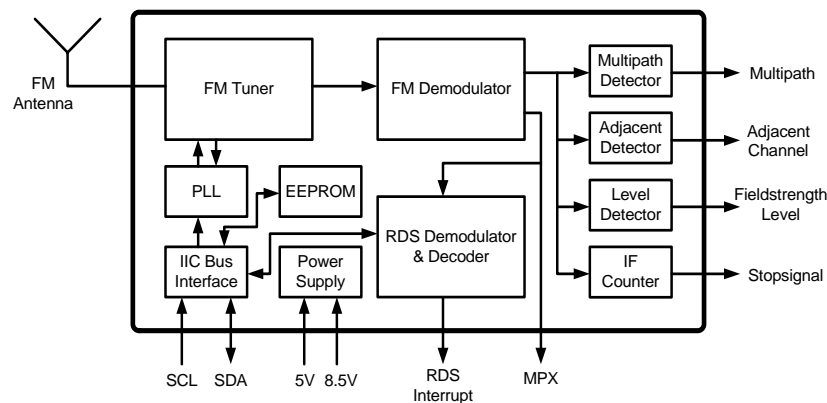
PARAMETER	MIN	TYP	MAX	UNIT
Antenna Input				
Input impedance		50		Ω
VSWR			4	
Field-strength level detector output				
Voltage	0		5	V
Adjacent channel detector output				
Voltage (open collector with pull up)	0.1		4.9	V
SCL (IIC bus)	High and Low levels are according to the IIC bus specification with thresholds of 3.3V or 5V.			
SDA (IIC bus)				
Stop signal output				
Voltage	0.2		5	V
Maximum sink current			1	mA
Multipath detector output				
Voltage	0.1		4.9	V
Output resistance		2.5		kΩ
MPX audio output				
Load resistance	20			kΩ
Output resistance			50	Ω
Interrupt output				
Low level voltage			1.2	V
High level voltage	4			V
Output resistance			10	kΩ

### ELECTRICAL CHARACTERISTICS

PARAMETER	MIN	TYP	MAX	UNIT
Receiving frequency range				
USA band	87.9		107.9	MHz
Europe band	87.5		108	MHz
Sensitivity for S/N=26 dB		2		μV
S/N at high RF input		60		dB
Image rejection		70		dB
AM supression		55		dB
THD+N		0.15		%
Adjacent channel selectivity (100 kHz)		10		dB
Alternate channel selectivity (200 kHz)		72		dB
Intermodulation rejection		70		dB
Frequency response		-1		dB
MPX output voltage (deviation=75 kHz)		430		mV
Field-strength output voltage				
RF input = 30 dBμV		1.8		V
RF input = 100 dBμV		4		V
RDS sensitivity for 50% correct received blocks		18		dBμV
Standard measurement conditions	Antenna dummy with loss=6dB; RF input = 60dBμV; deviation = 40kHz; audio frequency = 1kHz; de-emphasis = 50μs; CCIR weighted			

### MECHANICAL CHARACTERISTICS

PARAMETER	DIMENSION	UNIT
Vertical Housing (Product ID = 3x0923)		
Length	48	mm
Width	14	mm
Height	29.8	mm
All inputs/outputs via pins; number of pins is 16; pin grid is 2.54mm		



MT1393ETC FM/RDS Tuner Block Diagram

Microtune, Inc., 2201 Tenth Street, Plano, TX 75074, USA

Tel: +1-972-673-1600, Fax: +1-972-673-1602, E-mail: sales@microtune.com, Web site: [www.microtune.com](http://www.microtune.com)

For a detailed list of design centers, sales offices, and sales representatives, visit our Web site at [www.microtune.com](http://www.microtune.com).

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